THAT WHICH IS CLAIMED IS:

1. A method for determining an irradiation dose delivered *in situ* to an object, comprising the steps of:

irradiating at least one object with a radiation dose which is sufficient to sterilize said object;

positioning a sensor proximate to the object such that it is held proximate thereto during said irradiating step, wherein said sensor has associated operational parameters, and wherein one or more of the operational parameters is configured to change responsive to said irradiating step;

wirelessly transmitting data associated with the change in the operational parameter in the sensor; and

determining the radiation dose received by the object during said irradiating step based on the change in the operational parameter.

2. A method according to Claim 1, wherein the object is an edible item.

3. A method according to Claim 1, wherein the object is a medical object.

4. A method according to Claim 1, wherein the sensor comprises a MOSFET device with an associated threshold voltage which changes when exposed to radiation, and wherein said determining step further includes the step of analyzing the change in the threshold voltage.

5. A method according to Claim 4, wherein said method further comprises the step of determining a pre-radiation threshold voltage value prior to said irradiating step.

6. A method according to Claim 5, wherein said determining step comprises comparing the value of the pre-radiation threshold voltage to the value obtained in said transmitting step.

7. A method according to Claim 1, wherein the sensor has an associated resonance frequency which changes when exposed to radiation, and wherein said determining step comprises analyzing the change in the resonance frequency.

8. A method according to Claim 1, wherein the sensor includes an electronic circuit having a Q factor, a resonance frequency, an inductance, and a resistance associated therewith, the Q factor corresponding to the resonance frequency, the inductance, and the resistance, and wherein the Q factor changes when exposed to radiation, and wherein said determining step includes the step of analyzing the change in the Q factor.

9. A method according to Claim 1, wherein said sensor includes a tank circuit with a capacitor element, wherein the capacitor element comprises opposing conductive plates and a dielectric material therebetween, and wherein the dielectric material of the capacitor element is selected such that one or more of a physical or electrical characteristic of the dielectric material is altered when irradiated.

10. A method according to Claim 1, said method further comprising the step of packaging the object in a container prior to said irradiating step.

11. A method according to Claim 1, wherein said transmitting and determining steps are carried out at least once during said irradiating step.

12. A method according to Claim 1, wherein said transmitting and determining steps are repeated during said irradiating step.

13. A method according to Claim 1, wherein said transmitting and determining steps are carried out at least once after the completion of said irradiating step, and wherein said irradiating step is carried out such that it introduces radiation which is in the range of from about 0.01-10kGy to the object.

14. A method according to Claim 13, wherein said transmitting and determining steps are also carried out at least once during said irradiating step.

15. A method according to Claim 13, further comprising the step of monitoring the determined radiation dose during said irradiating step to determine when to terminate said irradiating step.

16. A method according to Claim 1, wherein the determined radiation dose provided by said determining step is calculated by a computer program based on input of data provided by said transmitting step.

17. A method according to Claim 16, wherein the determined radiation dose provided by said determining step is input into a computer readable database as an electronic process history data record.

18. A method according to Claim 1, wherein said irradiating step is carried out such that a plurality of objects grouped as a related production lot are irradiated, and wherein said positioning step is carried out by positioning a sensor on selected ones of objects within the production lot to provide sampling based process control radiation dose information.

19. A method according to Claim 1, wherein the sensor comprises a bipolar transistor with an associated Hfe which changes when exposed to radiation, and wherein said determining step comprises analyzing the change in the Hfe.

20. A method according to Claim 1, wherein the sensor comprises a diode with a leakage current which changes after exposure to radiation, and wherein said determining step comprises evaluating the leakage current to determine the radiation dose.

21. A radiation dose evaluation system, comprising:

a radiation or electron beam source;

at least one passive dosimeter sensor adapted to be positioned on an object undergoing irradiation treatment such that said sensor is exposed to an amount of radiation representative of the amount of radiation exposure of the object;

at least one wireless reader operably associated with said sensor such that, in operation, it powers said sensor and receives data associated with said sensor;

a controller operably associated with said wireless reader; and

a computer program operably associated with said controller, said computer program configured to analyze data transmitted from said sensor to said wireless reader to determine a radiation dose associated therewith.

22. A radiation dose evaluation system according to Claim 21, wherein said source is configured to emit radiation to said object at levels above about 0.01kGy to below about 30kGy.

23. A radiation dose evaluation system according to Claim 21, wherein said at least one dosimeter is a single use disposable dosimeter.

24. A radiation dose evaluation system according to Claim 21, wherein said at least one dosimeter is configured to evaluate irradiation in the range of between about 1-5kGy.

25. A radiation dose evaluation system according to Claim 21, wherein said at least one dosimeter comprises a plurality of sets of different dosimeters, and wherein each set is configured to evaluate irradiation for a selected food application.

26. A radiation dose evaluation system according to Claim 25, wherein one set is configured to evaluate irradiation doses corresponding to the sterilization of poultry.

27. A radiation dose evaluation system according to Claim 25, wherein one set is configured to evaluate irradiation doses corresponding to the sterilization of beef.

28. A radiation dose evaluation system according to Claim 25, wherein one set is configured to evaluate irradiation doses corresponding to the sterilization of a frozen meat.

29. A radiation dose evaluation system according to Claim 25, wherein one set is configured to evaluate irradiation doses corresponding to the sterilization of fruit.

30. A radiation dose evaluation system according to Claim 25, wherein one set is configured to evaluate irradiation doses corresponding to the sterilization of vegetables.

31. A radiation dose evaluation system according to Claim 25, wherein one set is configured to evaluate irradiation doses corresponding to the sterilization of melon.

32. A radiation dose evaluation system according to Claim 25, wherein one set is configured to evaluate irradiation doses corresponding to the sterilization of pet food.

33. A radiation dose evaluation system according to Claim 21, wherein said controller is configured such that it controls the radiation exposure or residence time of the object based on the data received from said sensor while said radiation source is actively irradiating the object.

34. A radiation dose evaluation system according to Claim 21, wherein said at least one wireless reader comprises first and second wireless readers, said first reader configured to resonate said sensor before irradiation and said second reader configured to resonate said sensor after irradiation.

35. A radiation dose evaluation system according to Claim 21, wherein said sensor comprises a tank circuit with a MOSFET device, and wherein said

MOSFET device has a threshold voltage value which is altered responsive to exposure to a desired irradiation level.

36. A radiation dose evaluation system according to Claim 35, wherein said MOSFET has a pre-irradiation voltage value, and wherein said computer program determines the radiation dose based upon a comparison of the altered threshold voltage value with the pre-irradiation threshold voltage value.

37. A radiation dose evaluation system according to Claim 21, wherein said sensor comprises a tank circuit including an inductor and a capacitor.

38. A radiation dose evaluation system according to Claim 37, wherein said sensor further comprises a MOSFET device, and wherein, in operation, said sensor is configured to generate a first frequency spectrum associated with a pre-irradiation state, and a second frequency spectrum associated with an irradiated state, and wherein said computer program is configured to determine a radiation dose based on a comparison of data provided by the first and second frequency spectrums.

39. A radiation dose evaluation system according to Claim 38, wherein said computer program is configured to compare the amplitudes of at least one selected frequency within the first and second frequency spectrums to determine a difference in the threshold voltage values and then to determine a radiation exposure level based thereon.

40. A radiation dose evaluation system according to Claim 37, wherein said sensor tank circuit has a resonant frequency associated therewith which changes in response to exposure to irradiation within a desired radiation exposure range, and wherein said computer program is configured to determine a radiation dose based on the change in said tank circuit resonant frequency.

41. A radiation dose evaluation system according to Claim 37, wherein said computer program is configured to consider at least one selected electronic parameter value associated with said tank circuit to determine a radiation dose.

42. A radiation dose evaluation system according to Claim 21, further comprising a computer program database operably associated with said controller, said database being configured to provide a process history of the object.

43. A radiation dose evaluation system according to Claim 21, wherein said sensor comprises a tank circuit with a bipolar transistor having an Hfe associated therewith, and wherein said bipolar transistor Hfe is altered responsive to exposure to radiation in a desired irradiation level.

44. A radiation dose evaluation system according to Claim 21, wherein said sensor comprises a tank circuit with a diode, and wherein said diode has a leakage current which is altered responsive to exposure to radiation in a desired irradiation level.

45. A radiation dose sensor, comprising:

a capacitor having a dielectric material and two opposing plates configured to sandwich said dielectric material; and

an inductor operably associated with said capacitor,

wherein, in operation, said sensor is configured to be inductively powered by a remote receiver and to wirelessly relay data associated therewith, and wherein said sensor is configured such that it alters at least one predetermined electrical property in responsive to exposure to irradiation in a desired operative range associated with the sterilization of objects.

46. A sensor according to Claim 45, wherein said capacitor dielectric material is selected such that it changes at least one associated characteristic upon exposure to radiation and wirelessly relayed and correlated to the amount of radiation the sensor receives to thereby provide a radiation dose sensor.

47. A radiation dose sensor according to Claim 45, further comprising a MOSFET device configured to operate within a desired radiation exposure range, and wherein said MOSFET device has a threshold voltage value associated therewith which alters upon exposure to radiation in the desired exposure range.

48. A radiation dose sensor according to Claim 46, wherein said sensor has a first resonant frequency prior to exposure to radiation, and a plurality of altered resonant frequencies different from said first resonant frequency, the altered frequencies corresponding to a quantifiable amount of radiation exposure.

49. A radiation dose sensor according to Claim 45, wherein said sensor is configured to telemetrically relay its resonant frequency during operation.

50. A radiation dose sensor according to Claim 46, wherein said dielectric material change is at least one of an associated conductivity, capacitance value, and dielectric constant.

51. A radiation dose sensor according to Claim 45, wherein said sensor is configured to detect radiation doses in the range of from about 0.01-10 kGy.

52. A radiation dose sensor according to Claim 45, wherein said sensor is configured to detect radiation doses in the range of from about 10-50 kGy.

53. A radiation dose sensor according to Claim 45, wherein said sensor is configured with a low profile when viewed from the side.

54. A radiation dose sensor according to Claim 45, wherein said sensor is substantially planar.

55. A radiation dose sensor according to Claim 54, wherein said sensor comprises a electronic circuit layer and an underlying label layer, and wherein said circuit layer is releasably attached to said label layer.

56. A radiation dose sensor according to Claim 45, wherein said sensor inductor and capacitor defines a tank circuit which has an associated Q factor, wherein said sensor has a first Q factor prior to exposure to radiation above a threshold level, and a plurality of Q factors different from said first Q factor, the plurality of Q factors representing a range of radiation levels which can be correlated to the amount of radiation exposure above the threshold level.

57. A radiation sensor according to Claim 45, wherein said sensor is configured to be attached to a sealed food package.

58. A radiation sensor according to Claim 45, in combination with a container configured to hold a plurality of food items, wherein said sensor is attached to said container.

59. A method for determining the radiation dose of an object or product, comprising the steps of:

positioning a dosimetry sensor on an object, wherein said sensor comprises a tank circuit with an inductor and capacitor and a selected electronic component which has an operational parameter which alters when exposed to radiation;

irradiating the object and the sensor to a level which is sufficient to sterilize the object and to induce alteration in the selected operational parameter of the sensor, wherein the alteration is representative of the amount of irradiation received by the sensor; and

determining the amount of irradiation based on the value of the altered operational parameter of the sensor.

60. A method according to Claim 59, wherein the operational parameter is associated with a detectable change in an electronic parameter, and wherein the method further comprises the steps of:

establishing the value of the electronic parameter before radiation; and

detecting the value of the electronic parameter after or during said irradiating step,

wherein said determining step comprises analyzing the established and detected values of the electronic parameter.

61. A method according to Claim 59, further comprising wirelessly transmitting data from the sensor to a remote reader.

62. A method according to Claim 60, wherein the object is sealed within a container before said irradiating step.

63. A method according to Claim 60, wherein the sensor comprises a tank circuit and a MOS device, the MOS device having a threshold voltage value associated therewith, and wherein said detecting step detects the threshold voltage value of the MOS device and said determining step considers the detected threshold voltage.

64. A method according to Claim 63, wherein said method comprises the step of obtaining a pre-irradiation threshold voltage value and obtaining a post-irradiation voltage value and said determining step compares the pre and post irradiation values to determine the radiation dose.

65. A method according to Claim 59, wherein the sensor comprises a tank circuit and a bipolar transistor, the transistor having an Hfe value associated therewith, wherein said method comprises obtaining a pre-irradiation Hfe value and a post-irradiation Hfe value and said determining step compares the pre and post irradiation values to determine the radiation dose.

66. A method according to Claim 60, wherein the sensor comprises a tank circuit and a diode, the diode having a leakage current associated therewith, and wherein said detecting step is used to estimate the leakage current of the diode and said determining step considers the estimated leakage current.

67. A method according to Claim 60, wherein the object is a food item, and wherein said detecting and determining steps are carried out automatically without direct human manipulation of the sensor.

68. A method according to Claim 60, further comprising controlling the time the object is exposed to the radiation source.